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EXAMINER

CHOW, LIXI

ART UNIT	PAPER NUMBER
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2652

DATE MAILED: 02/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/806,106

Applicant(s)

AHN ET AL.

Examiner

Lixi Chow

Art Unit

2652

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 6-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-12 and 15-25 is/are rejected.
- 7) ☒ Claim(s) 13 and 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

1. Claims 1-3 and 6-25 are pending in this application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 7 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Maeda et al. (US 5,144,601; hereafter Maeda).

Regarding claim 1:

Maeda discloses a method of recording data on an optical recording medium, the method comprising:

generating channel modulated digital data (see Fig. 3C, the new data 1001 corresponds to the channel modulated digital data);

generating a recording waveform having an erase pattern (see Fig. 3D, the pulses E correspond to the erase pattern) containing a multi-pulse of pulses having corresponding low and high powers (the erase pulses have low and high powers), and a recording pattern in response to the channel modulated digital data (see Figs. 3A-3E); and

forming a first level of the channel modulated digital data as a mark and forming a second level of the channel modulated digital data as a space by using the generated recording waveform (see Fig. 3C, the first level is represented by “1” of the channel modulated digital data; the second level is represented by “0” of the channel modulated digital data; the 1s and 0s create the marks and spaces, respectively, as shown in Fig. 3E);

wherein the generating the recording waveform comprises causing a power level of a trailing pulse of the erase pulse to be the high level of the multi-pulse and a power level of a leading pulse of the erase pattern to be the low level or the high level (see Fig. 3D, the leading pulse of the erase pattern is at high level power and the trailing pulse of the erase pattern is also at high level power).

Regarding claim 7:

Claim 7 recites similar limitations as claim 1. Hence detail description of the same limitations met by Maeda is omitted here. In addition to claim 1, Maeda also discloses the recording waveform comprises: causing a power level of a leading pulse of the erase pattern to be a same level of the multi-pulse as a power level of a trailing pulse of the multi-pulse (see Fig. 3D, the leading and trailing pulses of the multi-pulse erase pattern are both at high level power) and is above a cooling level of the recording and/or erase pattern (the cooling pulse is the low level power, which is inherently lower than the high level power).

Regarding claim 8:

Maeda further discloses the method, wherein the generating of the recording waveform comprises:

causing a ratio of a duration time of a high level and another duration time of a low level of the multi-pulse to be substantially 1:1 (see Fig. 3D, the width of each of the high level and low level are the same, hence having the ratio of 1:1).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda in view of Clark et al. (US 5,802,031; hereafter Clark).

Regarding claim 3:

Maeda does not disclose the method of recording data, wherein the generating of the channel modulated digital data comprises: performing a Run Length Limited (RLL) (1, 7) method. However, Clark discloses a method of writing data on optical disk, wherein the pulse width modulation of recording pattern is in accordance with RLL (1,7) method (see Clark, col. 6, lines 51-54).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to perform the recording of the channel modulated digital data in accordance with RLL (1, 7) method as taught by Clark, such that recording of marks and spaces of length 2T to 8T for standard M-O recording system is possible (see Clark, col. 6, lines 51-59). Hence, recording of marks or spaces amongst different type of recording format can be achieved.

6. Claims 1, 2, 6, 8-12, 15, 16 and 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichihara (US 6,396,792).

Regarding claim 1:

Ichihara discloses a method of recording data on an optical recording medium, the method comprising:

generating channel modulated digital data (see Fig. 5, element 26, and Col. 10, lines 39-42);

generating a recording waveform having an erase pattern containing a multi-pulse of pulses having corresponding low and high powers, and a recording pattern in response to the channel modulated digital data (see Figs. 1A-1B, and Col. 11, lines 8-15); and

forming a first level of the channel modulated digital data as a mark and forming a second level of the channel modulated digital data as a space by using the generated recording waveform (see Figs. 1A-1B; first level is Pa and second level is Pc1 in Fig. 1B),

wherein the generating of the recording waveform comprises causing a power level of a leading pulse of the erase pattern to be the low level or the high level (see Fig. 1B, the leading pulse of the multi-pulse erase pattern is at high power level).

Ichihara does not specifically show the trailing pulse of the erase pulse to be the high level of the multi-pulse. However, Ichihara does mention that the power levels for the erase pattern are not limited to those shown in the figure, i.e. Fig. 1B(see col. 6, lines 35-44). In addition, Ichihara suggests a plurality of power levels lower than the recording level (Pa) are acceptable for setting the erase power level (see col. 6, lines 58-61). Hence, Examiner maintains that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (see MPEP § 2144.05(II)(A)).

Therefore, at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have set the power level of the leading and trailing pulse of the multi-pulse erase pattern in various way as suggested by Ichihara. In particular, it would be obvious for a person with an ordinary skill to have modified the power level of a multi-pulse erase pattern, wherein trailing pulse is at high power level. One would have been motivated to do this,

Art Unit: 2652

because optimization of erase power level are different among different type of discs and conditions (see Ichihara, col. 11, lines 16-25; one would have to consider the material of the recording layer and the optical property of the laser in order to determine the optimum erase power level); therefore, it would be necessary to provide erase pulses in various combination of ranges from routine experimentation, such that optimum power level of the erase pattern can be determined in order to ensure the entire area in the width direction of the recording track uniformly passes the temperature zone that promotes the generation of crystal nuclei (see col. 7, lines 1-5).

Referring to claim 2:

Ichihara discloses the method of claim 1, wherein the generating of the channel modulated digital data comprises:

performing a Run Length Limited (RLL)(2, 10) method (Col. 5, lines 40-41 mention the shortest mark being 3tw and the longest mark being 11tw; this suggest RLL (2, 10) method was performed).

Regarding claim 6:

Ichihara discloses a method of recording data on an optical recording medium, the method comprising:

generating channel modulated digital data (see Fig. 5, element 26, and Col. 10, lines 39-42);

generating a recording waveform having an erase pattern containing a multi-pulse of pulses having corresponding low and high powers (erase pattern contains multi-pulse having Pc1

and Pc2 as high and low power), and a recording pattern in response to the channel modulated digital data (see Figs. 1A-1B, and Col. 11, lines 8-15); and

forming a first level of the channel modulated digital data as a mark and forming a second level of the channel modulated digital data as a space by using the generated recording waveform (see Figs. 1A-1B; first level is Pa and second level is Pc1 in Fig. 1B),

wherein the generating of the recording waveform comprises: causing the power level of the trailing pulse of the erase pattern to be the low level of the multi-pulse (see Fig. 1B, the last or trailing pulse of the erase pattern is at Pc2 power level), and the low level is greater than a cooling level of the recording and/or erase pattern (see col. 6, lines 35-45; the cooling pulse is the last pulse during the recording of a mark, which is set at power level of Pr; Pr power level is lower than the Pc2 or Pc1; hence, Pc2 is greater than a cooling level).

Ichihara does not specifically show the leading pulse of the erase pulse to be the low level of the multi-pulse. However, Ichihara does mention that the power levels for the erase pattern are not limited to those shown in the figure, i.e. Fig. 1B(see col. 6, lines 35-44). In addition, Ichihara suggests a plurality of power levels lower than the recording level (Pa) are acceptable for setting the erase power level (see col. 6, lines 58-61). Hence, Examiner maintains that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (see MPEP § 2144.05(II)(A)).

The motivational statement for this claim is the same as the motivational statement provided in claim 1 in respect to Ichihara. Hence, refer to claim 1 for the statement indicating the obviousness of modifying the teaching of Ichihara.

Referring to claim 8:

Ichihara discloses the method of claim 1, wherein the generating of the recording waveform comprises:

causing a ratio of a duration time of a high level and another duration time of a low level of the multi-pulse to be substantially 1:1 (see Fig. 1B, pulse width of each level (Pc1, and Pc2) is 0.5 tw).

Referring to claim 9:

Ichihara discloses the method of claim 8, wherein the generating of the recording waveform comprises:

causing the duration time of the high level to be half a clock cycle (see Col. 6, lines 62-64).

Referring to claim 10:

Ichihara discloses the method of claim 8, wherein the generating of the recording waveform comprises:

causing the ratio of the duration time of the high level and the duration time of the low level of the multi-pulse to be m:n where m and n are integers (see Fig. 1B and Col. 6, lines 23-34; Ichihara provides an example for Pc1 and Pc2 to be equal in time width, hence, m equal n).

Regarding claim 11:

Ichihara further discloses the method, wherein the generating of the channel modulated digital signal comprises:

forming a first level of an NRZI data signal as the mark and a second level of the NRZI data signal as the space (see Fig. 1A and col. 4, lines 57-50).

Regarding claim 12:

Ichihara further discloses the method, wherein the generating of the recording waveform comprises:

forming a cooling pulse as a part of the erase pattern (see col. 6, lines 35-45; Ichihara specifies that P_{c2} and P_{c1} are the power level of the erase pattern; also, Ichihara suggests that P_{c2} can be a P_r level, which is the cooling pulse level; therefore, a cooling pulse is a part of the erase pattern).

Regarding claim 15:

Ichihara further discloses the method, wherein the generating of the recording waveform comprises: forming the recording pattern having at least two power levels (see Fig. 1B, recording pattern have power level P_a and P_{c2}).

Regarding claim 16:

Ichihara further discloses the method, wherein the generating the recording waveform further comprises generating a cooling pulse concatenating the recording and erase patterns, in response to the channel modulated digital data, the cooling pulse having a power level below the low level (see col. 6, lines 35-45; the cooling pulse is the last pulse during the recording of a mark, which is set at power level of P_r and concatenating the recording and erase pattern; P_r power level is lower than the P_{c2} or P_{c1} ; hence, the cooling pulse power level is lower than the P_{c2}).

Regarding claims 22 and 23:

Claims 22 and 23 recite similar limitations as claims 18 and/or 19. Therefore, claims 22 and 23 are rejected under the same reasons set forth in claims 18 and/or 19.

Regarding claim 24:

Ichihara discloses the power of the trailing pulse of the erase pattern is greater than the power of the first one of the multi-pulses of the recording pattern (see col. 6, lines 52-53; Ichihara specifies that if the pulse width of the Pc1 is very short, then the power level of Pc1 may be higher/greater than the power level of the Pa).

Regarding claim 25:

Claim 25 recites similar limitations as claim 21. Thus, claim 25 is rejected under the same reasons set forth in claim 21.

7. Claims 17-19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichihara in view of Ushiyama et al. (US Pub. No. 2002/0176338; hereafter Ushiyama). For a description of Ichihara, see paragraph 6, above.

Regarding claim 17:

Ichihara further discloses the recording pattern contains another multi-pulse adjacent to the erase pattern (see Fig. 1B). Ichihara fail to disclose the recording waveform further comprises adjusting a first pulse of the another multi-pulse according to a property of the trailing pulse. However, Ushiyama disclose an apparatus for generating a recording waveform, wherein the first pulse of the recording pattern is adjusted according to a pulse of the trailing pulse (see Ushiyama, paragraph [0049]; the optimized pulse value changes based on the property of the space portion (the trailing pulse) located in the front of the recording pattern).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the method of Ichihara, so that the first pulse of the recording pattern is being adjusted according to the property of the trailing pulse as taught by Ushiyama. One of ordinary skill in the art would have been motivated to do this, because the optimum pulse value

Art Unit: 2652

changes according to the property of the space portion located in front of the recording pattern (see Ushiyama, paragraph [0049]). Essentially, the property of the last one of the pulses of the pattern is crucial in determining the optimum pulse value of the first pulse of the recording pattern.

Regarding claim 18:

Ichihara further discloses the power of the leading pulse of the erase pattern is equal to the power of the first one of the multi-pulses of the recording pattern (see col. 6, lines 52-57; Ichihara specifies that if the pulse width of the Pc1 is very short, then the power level of Pc1 may be equal to the power level of the Pa, which is the first one of the multi-pulse of the recording pattern).

Regarding claim 19:

Ichihara further discloses the power of the leading pulse of the erase pattern is other than the power of the first one of the multi-pulses of the recording pattern (see Fig. 1B; power of Pc1 is other than the power of Pa).

Regarding claim 21:

Ichihara further discloses the recording pattern comprises a cooling pulse concatenating the recording and erasing patterns and having a cooling power less than the power of the first pulse of the recording pattern and the low level of the erase pattern (see Fig. 1B and col. 6, lines 35-45; the cooling pulse is the last pulse during recording of a mark, which is can be set at Pr level; the first pulse of the recording pattern is at power level of Pa, and the low level of the erase pattern is Pc2; hence, Pr is lower than Pa and Pc2).

8. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ichihara in view of Tanaka et al. (US 5,825,742; hereafter Tanaka). For a description of Ichihara, see the rejection of paragraph 6, above.

Regarding claim 20:

Ichihara does not disclose a multi-pulse recording pattern comprising a recording pulse having a power greater than the power of the first one of the pulses of the recording pattern. However, Tanaka discloses a multi-pulses recording pattern comprising a recording pulse having a power greater than the power of the first one of the pulses of the recording pattern (see Tanaka, Fig. 8, Pw2 is greater than the first pulse of the multi-pulses recording pattern).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have adopted the method taught by Tanaka for recording information having a recording power higher than the power of the first one of the pulses of the multi-pulses recording pattern in the medium provided by Ichihara. One would be motivated to do this, so edge shift and jitter of the recording mark can be suppressed (see Tanaka, col. 4, lines 1-22).

Allowable Subject Matter

9. Claims 13 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In regards to claim 13, none of the references of record alone or in combination disclose or suggest a recording method, wherein the generating of the recording waveform comprises upon **determining whether an ending time of the cooling pulse is less than or greater than**

0.5Ts from a trailing edge of the NRZI data signal, causing a duration time of a leading pulse forming the erase pattern to be over 0.5Ts.

Claim 14 depends from claim 13. Therefore, claim 14 is objected under the same reason set forth above.

Response to Arguments

10. Applicant's arguments filed 12/06/05 have been fully considered but they are not persuasive.

I. Applicant argues Ichihara does not disclose or suggest, "generating of the recording waveform comprises causing a power level of a trailing pulse of the erase pattern to be the high level of the multi-pulse and a power level of a leading pulse of the erase pulse to be the low level or the high level". However, Examiner respectfully disagrees. Although Ichihara does not specifically illustrate in the figures showing the leading pulse of the multi-pulse is at the low power level and a trailing pulse of the multi-pulse is at the high power level. Nevertheless, Ichihara does suggest that plurality of other power levels other than the Pc1 and Pc2 are acceptable for setting as erase power levels (see col. 6, lines 35-61). Given with such suggestion, it would be obvious for a person of ordinary skill in the art to obtain various combination of power level for the leading pulse and the trailing pulses of the multi-pulse erase pattern, thereby capable of determining the optimum erase pattern level for plurality of discs having different recording conditions. Since Ichihara shows the recording and erasing of information that would improve the overwrite erasability of the optical recording medium, one would be motivated to try the different combination of the erase power in order to achieve that goal. Furthermore, Examiner maintains that where the general conditions of a claim are disclosed in the prior art, it

is not inventive to discover the optimum or workable ranges by routine experimentation (see MPEP § 2144.05(II)(A)). Accordingly, claim 1 and other independent claims having similar limitations are not patentable over Ichihara.

II. Argument in regards to claim 6 is also not persuasive for the similar reasons set forth above.

III. Applicant's arguments with respect to claims 3, 7 and 17-25 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lixi Chow whose telephone number is 571-272-7571. The examiner can normally be reached on Mon-Fri, 8:30am to 6:00pm.

Art Unit: 2652

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, A. L. Wellington can be reached on 571-272-4483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LC


ANDREA WELLINGTON
SUPERVISORY PATENT EXAMINER